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EXAMINER
EDMONDSON, LYNNE RENEE

ART UNIT	PAPER NUMBER
1725	6

DATE MAILED: 12/02/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/025,402	STOL ET AL.	
	Examiner	Art Unit	
	Lynne Edmondson	1725	

-- The MAILING DATE of this communication app ars on the cover she t with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 December 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☒ Claim(s) *31 and 32* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 December 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4,5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: Beam 50 is referenced on page 11 paragraph 35 but not shown in the drawings (Figure 5). Recess 178 is referenced on page 14 paragraph 38 but not shown the drawings (Figure 9d). Flange 122 and sides 124 are referenced on page 13 paragraph 37 but not shown in the drawings (Figure 7f). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "172" has been used to designate both a flange and a recess. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities: Page 12, paragraph 37, lines 3-4 contain the text "On suitable diameter d of tip 12 of the rivet 10 is about 10 mm." It is not clear whether this is a typographical error or a longer section

of text is missing. For examination purposes, it is presumed that the word "On" should be "One". Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-4, 6-9, 11-17, 25, 26 and 28-30 are rejected under 35 U.S.C. 102(e) as being anticipated by Takeshita et al. (USPN 6213379).

Takeshita teaches a method of joining multiple Al sheets (figure 8, col 6 lines 44-56) and col 10 lines 8-13) by providing a metal rivet 10) having a head (11) and a tip (12) for entering into the components wherein the rivet is rotated while plunging into at least the first sheet, a joint is formed on solidification (col 6 lines 25-46 and col 10 lines 8-60). The rivet (plug) is formed of the same material as the components and would have the same hardness (col 6 lines 44-46, col 8 lines 49-54 and col 10 lines 8-13). The rivet may be placed in a predrilled hole (col 2 lines 28-63). As shown in figure 2B, the rivet comprises a pointed tip and a helical groove (thread) along an exterior surface. Although not shown in the drawings, the nature of the process is such that when the

rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised (pushed outward, col 10 lines 49-53). The sheets are held by a clamp and a backing anvil (support) wherein the backing anvil comprises a recess which receives the extruded flash or raised portion (figure 11, col 6 lines 1-18, col 8 lines 38-44 and col 10 lines 25-34). The extended rivet tip or head (top or bottom of the plug) and flash may be removed to make the rivet flush with the upper and lower surfaces (col 5 lines 49-58 and col 10 lines 13-16 and lines 55-57). An alternate rivet comprises a bore (54) which extends partially through the rivet and a flange and lip (54, 54) which can hide and collect flash between the rivet and exterior sheet surface (figures 5A-5D and figure 7C). The bore may be used to attach another component (figures 8-10D and 12A-12D). The rivet head comprises a shear portion (81) (col 8 lines 18-24). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including conventional riveting and bolting. See also Takeshita claims 1-13.

6. Claims 1-4, 7-9, 18, 21, 23, 25, 26, 28 and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Waldron et al. (USPN 6227433 B1).

Waldron teaches a method of joining a pair of overlapped aluminum components (col 4 lines 55-60) by providing a metal rivet (fastener 24) having a head (38) and a tip for entering into the components wherein the rivet is rotated while plunging into at least the first sheet. A joint is formed on solidification. The components have the same hardness (same material, same melting point) as the plug (col 3 lines 1-40). As shown

in figure 1, the rivet tip (24) is pointed, however, the rivet can be any shape (col 4 lines 33-38). Three components or more may be joined with rivets introduced from above and below (col 4 lines 38-47). Although not shown in the drawings, the nature of the process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised. The rivet tip can extend through the second component or may be flush within the second component (col 3 lines 54-67 and col 4 lines 6-32). Parts are clamped in place on a backing anvil (25) (col 3 lines 15-22) with means for keeping the workpieces stationary (col 1 lines 16-20 and col 4 lines 47-55). The extended (protruding) rivet head is removed (col 2 lines 1-12 and col 4 lines 1-5). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including conventional riveting and bolting. See also Waldron claims 1-10.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takeshita et al. (USPN 6213379) in view of Midling et al. (WO 99/39861 A1).

Takeshita teaches a method of joining multiple Al sheets (figure 8, col 6 lines 44-56) and col 10 lines 8-13) by providing a metal rivet 10) having a head (11) and a tip (12) for entering into the components wherein the rivet is rotated while plunging into at least the first sheet, a joint is formed on solidification (col 6 lines 25-46 and col 10 lines 8-60). The rivet (plug) is formed of the same material as the components and would have the same hardness (col 6 lines 44-46, col 8 lines 49-54 and col 10 lines 8-13). The rivet may be placed in a predrilled hole (col 2 lines 28-63). As shown in figure 2B, the rivet comprises a pointed tip and a helical groove (thread) along an exterior surface. Although not shown in the drawings, the nature of the process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised (pushed outward, col 10 lines 49-53). The sheets are held by a clamp and a backing anvil (support) wherein the backing anvil comprises a recess which receives the extruded flash or raised portion (figure 11, col 6 lines 1-18, col 8 lines 38-44 and col 10 lines 25-34). The extended rivet tip or head (top or bottom of the plug) and flash may be removed to make the rivet flush with the upper and lower surfaces (col 5 lines 49-58 and col 10 lines 13-16 and lines 55-57). An alternate rivet comprises a bore (54) which extends partially through the rivet and a flange and lip (54, 54) which can hide and collect flash between the rivet and exterior sheet surface (figures 5A-5D and figure 7C). The bore may be used to attach another component (figures 8-10D and 12A-12D). The rivet head comprises a shear portion (81) (col 8 lines 18-24). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including

conventional riveting and bolting. Although preheating workpieces prior to welding is known, there is no disclosure of preheating the Al components prior to plunging the rivet therein.

Midling teaches friction stir welding wherein the Al members (page 2, paragraph 1) are preheated prior to insertion of the tool to increase welding speed and quality (page 3, paragraphs 1-4). See also Midling claims 1, 4 and 5.

It would have been obvious to one of ordinary skill in the art at the time of the invention to preheat the components for assistance in heating the weldment (Takeshita, col 4 lines 59-65), particularly large weld interfaces, in a short time (Takeshita, col 2 lines 50-61) and thereby form a sound weldment with good geometric properties using significantly less rotational power (Takeshita, col 3 lines 1-8).

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Waldron et al. (USPN 6227433 B1) in view of Martin et al. (USPN 3477115).

Waldron teaches a method of joining a pair of overlapped aluminum components (col 4 lines 55-60) by providing a metal rivet (fastener 24) having a head (38) and a tip for entering into the components wherein the rivet is rotated while plunging into at least the first sheet. A joint is formed on solidification. The components have the same hardness (same material, same melting point) as the plug (col 3 lines 1-40). As shown in figure 1, the rivet tip (24) is pointed, however, the rivet can be any shape (col 4 lines 33-38). Three components or more may be joined with rivets introduced from above and below (col 4 lines 38-47). Although not shown in the drawings, the nature of the

process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised. The rivet tip can extend through the second component or may be flush within the second component (col 3 lines 54-67 and col 4 lines 6-32). Parts are clamped in place on a backing anvil (25) (col 3 lines 15-22) with means for keeping the workpieces stationary (col 1 lines 16-20 and col 4 lines 47-55). The extended (protruding) rivet head is removed (col 2 lines 1-12 and col 4 lines 1-5). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including conventional riveting and bolting. However, the shape of the protrusion is not disclosed.

Martins teaches friction welding of a fastener through overlapped metal components wherein the fastener is within the second component and raises a portion of the second exposed surface having a semispherical configuration (figure 6 and col 2 line 15 – col 3 line 17).

It would have been obvious to one of ordinary skill in the art at the time of the invention that the shape of the fastener pushing material out of the exterior surface would force a semispherical configuration similar to the shape of the weld zone (32) (Waldron, figure 2).

10. Claims 12-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waldron et al. (USPN 6227433 B1) in view of Thomas et al. (USPN 5460317).

Waldron teaches a method of joining a pair of overlapped aluminum components (col 4 lines 55-60) by providing a metal rivet (fastener 24) having a head (38) and a tip

for entering into the components wherein the rivet is rotated while plunging into at least the first sheet. A joint is formed on solidification. The components have the same hardness (same material, same melting point) as the plug (col 3 lines 1-40). As shown in figure 1, the rivet tip (24) is pointed, however, the rivet can be any shape (col 4 lines 33-38). Three components or more may be joined with rivets introduced from above and below (col 4 lines 38-47). Although not shown in the drawings, the nature of the process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised. The rivet tip can extend through the second component or may be flush within the second component (col 3 lines 54-67 and col 4 lines 6-32). Parts are clamped in place on a backing anvil (25) (col 3 lines 15-22) with means for keeping the workpieces stationary (col 1 lines 16-20 and col 4 lines 47-55). The extended (protruding) rivet head is removed (col 2 lines 1-12 and col 4 lines 1-5). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including conventional riveting and bolting. However, the rivet shape is not further disclosed.

Thomas teaches friction welding a fastener comprising a bore which extends through the rivet (probe, stud, 27) a flange (upper portion) and lip (figure 16 and col 9 lines 8-14). Alternate stud (probe) configurations comprise points (figure 13A) and partial bores (figure 15).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a rivet shaped to remove flash, having features such as a central bore

or flange, to facilitate removal of excess material and thereby provide a flush bonded surface with no stress risers for a mechanically superior, light-weight and cost-effective bond (Waldron, col 2 lines 1-14 and col 3 line 58 – col 4 line 5).

11. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Waldron et al. (USPN 6227433 B1) in view of Colligan (USPN 5769306).

Waldron teaches a method of joining a pair of overlapped aluminum components (col 4 lines 55-60) by providing a metal rivet (fastener 24) having a head (38) and a tip for entering into the components wherein the rivet is rotated while plunging into at least the first sheet. A joint is formed on solidification. The components have the same hardness (same material, same melting point) as the plug (col 3 lines 1-40). As shown in figure 1, the rivet tip (24) is pointed, however, the rivet can be any shape (col 4 lines 33-38). Three components or more may be joined with rivets introduced from above and below (col 4 lines 38-47). Although not shown in the drawings, the nature of the process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised. The rivet tip can extend through the second component or may be flush within the second component (col 3 lines 54-67 and col 4 lines 6-32). Parts are clamped in place on a backing anvil (25) (col 3 lines 15-22) with means for keeping the workpieces stationary (col 1 lines 16-20 and col 4 lines 47-55). The extended (protruding) rivet head is removed (col 2 lines 1-12 and col 4 lines 1-5). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods

including conventional riveting and bolting. However, the backing plate shape is not further disclosed.

Colligan teaches friction stir welding with a backing plate comprising a recess formed to receive excess weld material (weld bead) (col 2 lines 13-32) and form a smooth weld surface (col 3 lines 1-32).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a backing plate with a weld recess to facilitate removal of excess material and thereby provide a flush bonded surface with no stress risers for a mechanically superior, light-weight and cost-effective bond (Waldron, col 2 lines 1-14 and col 3 line 58 – col 4 line 5).

12. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Waldron et al. (USPN 6227433 B1) in view of Xie (USPN 6067839).

Waldron teaches a method of joining a pair of overlapped aluminum components (col 4 lines 55-60) by providing a metal rivet (fastener 24) having a head (38) and a tip for entering into the components wherein the rivet is rotated while plunging into at least the first sheet. A joint is formed on solidification. The components have the same hardness (same material, same melting point) as the plug (col 3 lines 1-40). As shown in figure 1, the rivet tip (24) is pointed, however, the rivet can be any shape (col 4 lines 33-38). Three components or more may be joined with rivets introduced from above and below (col 4 lines 38-47). Although not shown in the drawings, the nature of the

process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised. The rivet tip can extend through the second component or may be flush within the second component (col 3 lines 54-67 and col 4 lines 6-32). Parts are clamped in place on a backing anvil (25) (col 3 lines 15-22) with means for keeping the workpieces stationary (col 1 lines 16-20 and col 4 lines 47-55). The extended (protruding) rivet head is removed (col 2 lines 1-12 and col 4 lines 1-5). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including conventional riveting and bolting. However, there is no disclosure of a pilot hole when fastening more than two components.

Xie teaches a method of friction welding a fastener to an aluminum component wherein a hole is first drilled, then the rivet is inserted (col 1 lines 16-40).

It would have been obvious to one of ordinary skill in the art at the time of the invention to drill a pilot hole prior to rivet insertion to facilitate secure bonding of three or more workpieces (Waldron, col 4 lines 38-47) from multiple directions and thereby prevent separation of the multiple layers of materials (Waldron, col 1 lines 10-20).

13. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Waldron et al. (USPN 6227433 B1) in view of Aota et al. (USPN 6050474).

Waldron teaches a method of joining a pair of overlapped aluminum components (col 4 lines 55-60) by providing a metal rivet (fastener 24) having a head (38) and a tip for entering into the components wherein the rivet is rotated while plunging into at least

the first sheet. A joint is formed on solidification. The components have the same hardness (same material, same melting point) as the plug (col 3 lines 1-40). As shown in figure 1, the rivet tip (24) is pointed, however, the rivet can be any shape (col 4 lines 33-38). Three components or more may be joined with rivets introduced from above and below (col 4 lines 38-47). Although not shown in the drawings, the nature of the process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised. The rivet tip can extend through the second component or may be flush within the second component (col 3 lines 54-67 and col 4 lines 6-32). Parts are clamped in place on a backing anvil (25) (col 3 lines 15-22) with means for keeping the workpieces stationary (col 1 lines 16-20 and col 4 lines 47-55). The extended (protruding) rivet head is removed (col 2 lines 1-12 and col 4 lines 1-5). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including conventional riveting and bolting. However, there is no disclosure simultaneously riveting both exterior surfaces.

Aota teaches friction stir welding with two rotary tools for simultaneous welding of both (upper and lower) exterior surfaces (claim 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to employ multiple tools to simultaneously bond three or more workpieces (Waldron, col 4 lines 38-47) from multiple directions and thereby form secure, reliable bonds in a fast and cost-effective manner (Waldron, col 2 lines 12-14).

14. Claims 12, 13 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waldron et al. (USPN 6227433 B1) in view of Cearlock et al. (USPN 4676707).

Waldron teaches a method of joining a pair of overlapped aluminum components (col 4 lines 55-60) by providing a metal rivet (fastener 24) having a head (38) and a tip for entering into the components wherein the rivet is rotated while plunging into at least the first sheet. A joint is formed on solidification. The components have the same hardness (same material, same melting point) as the plug (col 3 lines 1-40). As shown in figure 1, the rivet tip (24) is pointed, however, the rivet can be any shape (col 4 lines 33-38). Three components or more may be joined with rivets introduced from above and below (col 4 lines 38-47). Although not shown in the drawings, the nature of the process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised. The rivet tip can extend through the second component or may be flush within the second component (col 3 lines 54-67 and col 4 lines 6-32). Parts are clamped in place on a backing anvil (25) (col 3 lines 15-22) with means for keeping the workpieces stationary (col 1 lines 16-20 and col 4 lines 47-55). The extended (protruding) rivet head is removed (col 2 lines 1-12 and col 4 lines 1-5). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including conventional riveting and bolting. However, there is no disclosure of breaking the rivet head or of alternate rivet configurations.

Cearlock teaches a fusible fastener (col 3 lines 32-40) joined by friction welding (col 2 line 14 – col 3 line 18) with means for removing flash (figures 4 and 6 and col 3

lines 19-31) wherein the fastener head comprises a portion (50) which breaks off (shears) under fusion conditions (col 3 lines 56-63).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a rivet shaped with a narrowed portion near the head (Waldron, figure 5) which breaks off to facilitate removal and thereby provide a flush bonded surface with no stress risers for a mechanically superior, light-weight and cost-effective bond (Waldron, col 2 lines 1-14 and col 3 line 58 – col 4 line 5).

15. Claims 24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waldron et al. (USPN 6227433 B1) in view of Enomoto et al. (USPN 6344117 B2).

Waldron teaches a method of joining a pair of overlapped aluminum components (col 4 lines 55-60) by providing a metal rivet (fastener 24) having a head (38) and a tip for entering into the components wherein the rivet is rotated while plunging into at least the first sheet. A joint is formed on solidification. The components have the same hardness (same material, same melting point) as the plug (col 3 lines 1-40). As shown in figure 1, the rivet tip (24) is pointed, however, the rivet can be any shape (col 4 lines 33-38). Three components or more may be joined with rivets introduced from above and below (col 4 lines 38-47). Although not shown in the drawings, the nature of the process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised. The rivet tip can extend through the second component or may be flush within the second component (col 3 lines 54-67 and col 4 lines 6-32). Parts are clamped in place on a backing anvil

(25) (col 3 lines 15-22) with means for keeping the workpieces stationary (col 1 lines 16-20 and col 4 lines 47-55). The extended (protruding) rivet head is removed (col 2 lines 1-12 and col 4 lines 1-5). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including conventional riveting and bolting. However, there is no disclosure of clad members.

Enomoto teaches friction welding and mechanical fasteners to bond clad aluminum members (col 2 lines 20-41, lines 63-67 and col 5 line 61 – col 6 line15).

It would have been obvious to one of ordinary skill in the art at the time of the invention that bonding clad materials would be an obvious variation of bonding unclad materials as excess will be removed. Whether clad or unclad, the process steps would be the same and a strong, lightweight bond would be formed (Waldron, col 2 lines 1-14 and col 3 line 58 – col 4 line 5).

Allowable Subject Matter

16. Claims 31 and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

17. The following is a statement of reasons for the indication of allowable subject matter: The closest prior art teaches the invention essentially as claimed but teaches separate or integral (rivet configuration) flash removing means which are not linked to rotation means. See Waldron (USPN 6067839) and Jenkins (EPN 0337813). By

linking the flash removal device to a detachable rotation means, flash is continuously removed without interfering with the welding or solidification process thereby making the process faster and more efficient.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Thomas et al. (GB 2306366, helical groove, tip configurations), Luc (USPN 4144110, multiple simultaneous tools), Chakrabarti et al. (US 2002/0121319 A1, preheating, friction stir), Nippon Stud (JPN 2000-9122-A), Aicello (JPN 11-201177-A) and Mahoney et al. (USPN 5975406).

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne Edmondson whose telephone number is (703) 306-5699. The examiner can normally be reached on M-F from 7-4 with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on (703) 308-3318. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-7118 for regular communications and (703) 305-7115 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.

Lynne Edmondson
Examiner
Art Unit 1725

LRE
November 26, 2002

11/06/a